

ABSTRACT OF THE DISCLOSURE

First, a system for providing liquid refrigerant subcooling, subsequent to that subcooling accomplished by the primary condenser of an air conditioner, refrigeration or heat pump system, by means of evaporative cooling utilizing the condensate water of said air conditioner, refrigeration or heat pump system and/or some other water supply to wet the surface of the subcool heat exchanger and then passing the cold, dry building exhaust air required for good indoor air quality (or outside air) across the wetted surface of the subcool heat exchanger or by using building exhaust air only to conductively subcool. Said exhaust air could be used after first undergoing a sensible heat exchange with the incoming make up air. Said subcooling providing for an increased refrigeration capacity and efficiency of the system. Secondly, a system for providing hot gas discharge refrigerant precooling before said hot gas passes into the primary condenser of an air conditioner, refrigeration or heat pump system, by means of evaporative cooling utilizing the condensate water of said air conditioner, refrigeration or heat pump system and/or some other water supply to wet the surface of the precool heat exchanger and then passing the cold, dry building exhaust air required for good indoor air quality (or outdoor air) across the wetted surface of the precool heat exchanger. Said precooler providing lower power consumption of the compressor, lower head pressure, increased mass flow of the refrigerant and improved efficiency of the primary condenser of the air conditioning, refrigeration or heat pump system.

A combination subcooler and precooler system where the cold dry building exhaust air (or outdoor air) is first used to evaporatively subcool the liquid refrigerant in the water wetted (or dry) subcooler and then subsequently used to conductively cool the hot gas refrigerant passing through a dry surface precooler or alternately used to evaporatively cool the wetted surface of the precooler thereby evaporatively precooling the hot gas refrigerant passing through the precooler. Also, a system for providing suction gas postheating after the primary evaporator but before the refrigerant is drawn back into the compressor of a heat pump operating in the heating mode, by passing relatively warm building exhaust air through a postheat heat exchanger thereby adding normally wasted heat back into the heat pump system.

Finally, a combination subcooler and postheater system whereby building exhaust air(or outdoor air) is first used to conductively subcool the liquid refrigerant and then the subcooler warmed building exhaust air (or outdoor air) is subsequently used to conductively warm the refrigerant passing through the postheater thereby adding normally wasted heat back into a heat pump system operating in the heating mode.